REMARKS

The Office Action mailed April 30, 2003, has been carefully reviewed. The amendments made as directed above are in response thereto.

Claims 1 to 6, the pending claims in the application are all currently amended. Claims 7 and 8 have been withdrawn as a result of Examiner's imposed restriction requirement.

Claim 1 stands rejected under 35 U.S.C § 112 first paragraph as allegedly containing subject matter not described in the specification in such a way as to enable one skilled in the art to which it pertains to make and use the invention.

Claims 1-4 and 6 stand rejected under 35 U.S.C. § 112 second paragraph as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as their invention.

Claims 1-6 stand rejected under 35 U.S.C. § 102(b) as allegedly anticipated by or, in the alternative as obvious under 35 U.S.C. § 103(a) over Scholz et al., U.S. 5,512,354.

Claim 5 also stands rejected as allegedly obvious under 35 U.S.C. § 103(a) over Scholz et al., U.S. 5,512,354.

Claims 1, 2, 3, 5 and 6 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 6 and 7 of copending Application No. 09/856,314.

Applicants have made a thorough review of the specification, the abstract and the claims to ensure that the entire Application is presented in proper idiomatic English. The foregoing amendments to the abstract, specification and claims are necessitated in part, by Applicants' attempt to put them in proper English. No new matter is believed to have been added. It is believed that the Application is in compliance with 37 C.F.R. § 1.52(a) and (b).

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Also, the claims as amended herein are fully supported by the application as originally filed. Again, no new matter is believed to have been added. Reexamination, reconsideration, and allowance of the present application are respectfully requested in view of the foregoing amendments and the following additional remarks.

Rejections Under 35 U.S.C. § 112, first paragraph

Claim 1, and claims 2 to 6 depending therefrom, stand rejected under 35 U.S.C § 112 first paragraph as allegedly containing subject matter not described in the specification in such a way as to enable one skilled in the relevant art to make and use the invention. In particular, the Examiner claimed that the specification did not disclose how warp knit fabric is constructed to have a front and rear surface layers. Applicants respectfully disagree.

Since a person of ordinary skill in the art would know and understand how warp knit fabric is constructed to have two layers, the meaning and scope of the claim 1 is clear. As is well settled, claims need only "reasonably apprise those skilled in the art" as to their scope and be "as precise as the subject matter permits." Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 231 USPQ 81 (Fed. Cir. 1986), *cert denied*, 480 U.S. 947 (1987). Thus, "if the claims read in light of the specification reasonably apprise those skilled in the art of the scope of the invention, section 112 demands no more." Credle v. Bond, 25 F.3d 1566, 30 USPQ2d 1911 (Fed. Cir. 1994).

The present invention is not so directed as to how to construct a warp knit fabric having two layers as it is directed to the material components of those layers. It is obvious to one of skill in the art that the warp knit fabric having two layers is constructed, as commonly done in the art, by use of a 2-bar knitting machine. This Application is particularly directed to such a

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warp knit fabric consisting of a front surface layer of ultra fine yarn, and a rear surface layer consisting of synthetic yarn. Because one reasonably skilled in the art would reasonably be apprised that the warp knit fabric can be knit by means commonly known in this age-old industry, claims 1 to 6, directed to the material to be knitted is enabled. Applicants believe that one of ordinary skill in the art would arrive at the present invention by using any knitting means in the art, and by using the inventive combination of materials enablingly disclosed in the specification without undue experimentation. As such, Applicants respectfully request the withdrawal of this ground for rejection.

Rejections Under 35 U.S.C. § 112 , Second Paragraph

Claims 1-4 and 6 stand rejected under 35 U.S.C. § 112, second paragraph as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as their invention.

Claims 1-6 are rejected for the phrase "... having excellent touch, characterized in that; consist of ..." The Examiner deems the phrase, "excellent touch" as not being clearly defined. Also, the Examiner considers the transition phrases "characterized in that; consist of" as improper compounding of an open and closed ended transition phrases.

To obviate this ground for rejection, Applicants have deleted the phrase "excellent touch." Applicants have also deleted the phrase "characterized in that" and instead used the closed ended transition phrase "consisting of" to definitely and distinctly claim a two layered warp knit fabric made of ultra fine and synthetic yarn in the front and rear surface layers respectively.

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Regarding how to achieve the two-layer construction, Applicants reiterate that as stated above, this Application is not limited by the knitting method used. One of skill in the art is reasonably apprised of the use of two-bar knitting machine to make a two-layered knit fabric. Again, claim 1 is directed to the constituent material of the warp knit fabric and is not limited by how to fashion those materials into a knit fabric, said know how being old and notoriously well known in the art.

The Examiner further asserts that it is unclear whether Applicant is claiming a "synthetic yarn" or a "high shrinkage yarn," and that the term "high shrinkage yarn" is not described in the specification. Applicant respectfully disagrees.

In the specification, page 6, lines 9-16, Applicants clearly state as follows: "The high shrinkage yarn, which is used as the yarn of the rear surface layer, preferably has the shrinkage rate in boiling water of 15 to about 50 % and the stress of the heat shrinkage of 0.2 grams/denier or more. If the shrinkage rate in boiling water is less than 15 %, it is not possible to increase the density of ultra fine yarn, which is the yarn of the front surface layer, and thus the touch is poor since the shrinkage is extremely low. If the shrinkage rate of boiling water is more than 50 %, it is possible to increase the density of ultra fine yarn, which is the yarn of the front surface layer; however, it is hard to control the process width of the finished warp knit since the shrinkage is extremely high."

Applicants, being their own lexicographers, have clearly defined high shrinkage yarn to mean one that has a shrinkage rate in boiling water of 15 to about 50% and further went on to discuss the basis of that bounded range. Nevertheless, to obviate this ground for rejection, Applicants have amended claims 1, 4 and 5 to delete the occurrence of the "high shrinkage yarn" and respectfully request that this ground for rejection be withdrawn.

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Rejections Under 35 U.S.C. § 102/103

Claims 1 - 6 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103 (a) as obvious over Scholz et al., U.S. 5,512,354. The Examiner asserts that Scholz et al. is directed to a knit fabric comprising a nonfiberglass microdenier yarn in combination with a heat shrinkage yarn or a stretch yarn, and alternatively a stiffness controlling yarn – said fabric made for use in orthopedic applications such as casting materials.

As is well settled, for a prior art reference to anticipate in terms of 35 U.S.C. § 102, every element of the claimed invention must be identically shown in a single reference and these elements must be arranged as in the claim under review. In re Bond. 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). As the Examiner pointed out, Scholz et al. teaches that the backing layer, nonfiberglass microdenier yarns are formed from fibers or filaments having a diameter of no greater than 1.0 denier (Column 7, 1-10). On the other hand, the rear surface layer of the present invention is made of synthetic yarn with monofilament denier of 1 to about 5 denier. More particularly, whereas the front surface of the present invention is made of ultra fine yarn, that of Scholz et al. is made of heat shrinkage yarn. For at least that major distinction between the present invention and the prior art, a 35 U.S.C. § 102 rejection does not apply.

In fact, the present invention is patentably different from the prior art in object, effect and constitution. The object of the present invention is to create warp knit fabrics with exquisite touch to be used in clothing and synthetic leather. On the contrary, the object of the cited prior art is to improve formability and conformability backings for orthopedic immobilization devices and its materials are reasonably adapted to that end. In fact, to ensure the impregnability of its

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material with resins, the fabrics of Scholz et al. are apertured and basically functions as a backing for said immobilization devices. (Column 6, lines 30 –35). In contrast, the materials of the present invention are designed for softness, draping property, writing effect and appearance and are adapted to that end. As such, it is unreasonable for the Examiner to assert that the recovery rate of the materials of the present invention, a deficiency admittedly not taught by Scholz et al., is inherently to be assumed. As the Examiner can appreciate, an apertured, semi-rigid matrix taught by Scholz et al. will necessarily have a different recovery rate of elongation in the directions of wale and course from the exquisitely textured material of the present invention. The recovery rate of elongation being a function, not only of the constituent materials, but also of their spatial arrangement.

Applicants differ strongly with the Examiner in terms of characterization of the Scholz et al.'s invention. In particular, whereas the present invention strictly teaches a two-layered knit fabric, Scholz et al. teaches an augmented two layered fabric adding that an elastic stretch yarn may be knitted into the fabric under tension to provide some degree of compaction as the knit relaxes off the knitting machine. The augmentation of Scholz et al's two-layered material with an extensibility-imparting material is clearly not the same as a two-layered warp knit fabric. However, assuming for the sake of argument that Scholz et al. teaches a three layered warp knit fabric, the following differences in constituent materials can be deduced.

Item	The Present Invention	Scholz et al.
The surface (front) layer	Ultra fine yarn	High Shrinkage Yarn
The Intermediate Layer	None	Monofilament yarn
The back (rear) layer	Synthetic yarn (1 to about 5 denier)	Microdenier yarn (less than 1.0 denier)

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The differences in constitution and arrangement between Scholz et al. and the present invention are evident. Applicants have not seen any suggestion, express or implied, in Scholz et al. to suggest that the invention of claims 1-6 can be arrived at by substituting the microdenier yarn of Scholz et al. (less than 1.0 denier) with the synthetic yarn of the present invention. In particular, the high shrinkage yarn so critical to the formability and conformability of the fabric of Scholz et al. cannot merely be replaced by the ultra fine yarn of the present invention – so critical to its touch and feel. Nor is the fabric of the present invention interspersed with apertures – the use of which is critical to Scholz et al. In fact, Scholz et al. teaches away from the touch, feel, drapability and smoothness of the fabric of the present invention and instead teaches formability and conformability which implies flexibility with some measure of rigidity that is neither contemplated nor taught by the present invention. Moreover, the fact that a prior art could be modified so as to produce a claimed device is not a basis of an obviousness rejection unless the prior art suggested the desirability of such a modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). For at least the fact that Scholz et al. did not suggest the desirability of so modifying the constituent elements of their invention to arrive at the present invention, Applicants contend that their invention is patentably unobvious over Scholz et al. Applicants respectfully request the withdrawal of this ground for rejection.

Double Patenting Rejection

Claims 1, 2, 3, 5 and 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting in view of claims 1, 2, 6 and 7 of copending Application No. 09/856,314. According to the Examiner, because the warp knit of the present invention is not

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precluded from having an intermediate layer as in the copending Application, they are not patentably distinct. Applicant traverses as follows.

As amended, all the claims of the present application are now directed strictly to a two-layered warp knit patentably distinct from the three-layered warp knit of copending Application 09/856,314. Applicants believe that this ground for rejection is now moot and respectfully request its withdrawal.

CONCLUSION

In view of the foregoing remarks, Applicants submit that there is no basis for applying the previous rejections to the pending claims and withdrawal of the rejections is respectfully requested. The claims are believed to be in condition for allowance, and Applicant earnestly solicits from the Examiner early notification of allowability.

Should the Examiner have any questions or believe a personal or telephonic interview may be in order, he is invited to contact the undersigned at his earliest convenience.

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Respectfully submitted,

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Appendix B: Clean Version of Substitute Specification

A WARP KNIT HAVING AN EXCELLENT TOUCH, AND A PROCESS OF PREPARING THE SAME

This application claims priority to PCT/KR00/01202 filed Nov. 30, 2000, and to Republic of Korea patent applications 1999/58119 filed Dec. 16, 1999; 2000/54839 filed September 19, 2000; 2000/54840 filed September 19, 2000.

FIELD OF THE INVENTION

The present invention relates to a warp knit having excellent touch and a process of preparing such a warp knit.

More particularly, the present invention relates to a warp knit with softness and draping property due to its very fine structure and thus useful for materials of artificial leathers or ladies' clothes, and a process of preparing such a warp knit.

BACKGROUND OF THE INVENTION

If fiber becomes fine, its bending strength becomes weakened. Accordingly, since fabrics produced with ultra fine fiber have very soft touch, researches in connection with producing such ultra fine fiber on a commercial scale are developing very actively. Also, development of the technology capable of producing extremely fine synthetic yarn leads to great improvement of the value of the goods of sensitive materials for clothes.

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Generally, the process of preparing ultra fine fiber is divided into three processes: a direct spinning process; a two-component division type spinning process; and a two-component extraction type spinning process. In the direct spinning process, it is possible to prepare ultra fine fiber of 0.3 to about 0.5 denier. In the two components division type spinning process, it is possible to prepare ultra fine fiber of 0.2 denier. In the two components extraction type spinning process, it is possible to prepare ultra fine fiber of 0.01 denier or less.

When ultra fine fiber prepared by means of the direct spinning process is applied to a warp knit, warping property and appearance of the warp knit is very poor since numerous filaments are scattered. Furthermore, the warp knit thus prepared is very inferior to touch and writing effect.

When ultra fine fiber prepared by means of the two components division type composite spinning process consisting of nylon/polyester is applied to a warp knit, warping property and knitting property of the warp knit is very poor since the nylon is isolated from the polyester by means of the tension and friction in warping and knitting. Furthermore, appearance of the prepared product is very poor due to limit of the denier of the ultra fine fiber.

When the composite fiber of 0.05 denier or less prepared by means of the two components extraction type spinning process is applied to a warp knit, warping property, knitting property and touch of the warp knit are good; however, density in the structure of

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the warp knit is loosened and thus appearance of the warp knit is poor since the extraction component is extracted at the following processing step for producing the ultra fine fiber.

Producing goods with ultra fine fiber is developing in variety in connection with textile applications. However, producing goods with ultra fine fiber is not developing in connection with knitting applications since the poor warping property and the several drawbacks generated at processing step as mentioned above.

Accordingly, it is an object of the present invention to prepare a warp knit, which has excellent touch, shape stability, and appearance, and thus is suitable for materials of ladies' clothes, with good warping property and knitting property.

SUMMARY OF THE INVENTION

The present invention provides a warp knit which has excellent touch, shape stability, flexibility, and appearance, and thus is suitable for materials of ladies' clothes. The present invention also provides a process of preparing such a warp knit with good warping property and knitting property.

More particularly, the present invention relates to a warp knit having excellent touch, consist of a front surface layer and a rear surface layer, the front surface layer consisting of ultra fine yarn with mono-filament denier of 0.01 to about 0.9 denier, the rear surface layer consisting of synthetic yarn or high shrinkage yarn with mono-filament denier of 1 to about 5 denier, wherein the recovery rate of elongation in the directions of

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wale and course is 8 to about 30 %.

The present invention also relates to a process of preparing a warp knit having excellent touch, characterized by knitting a warp knit by using a composite fiber consisting of a fiber formation component of 0.01 to about 0.9 denier and an extraction component as a yarn of the front surface layer, and a synthetic yarn or high shrinkage yarn with monofilament of 1 to about 5 denier as a yarn of a rear surface layer, and then raising the warp knit until the shrinkage rate of the warp knit has reached 40% or more, and then pre-heating, extracting the extraction component from the composite fiber, dyeing, buffing, and finally heating the warp knit continuously.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a graph showing recovery rate of elongation of a warp knit measured using an Instron in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The inventors of the present application accomplished the present invention by taking notice of the fact that the selection and the combination of the materials in designing the structure of the fabric is very important in order to prepare polyester warp knit which is as soft as natural suede

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and which has excellent appearance as well as excellent warping property and knitting property.

First of all, the present invention uses a composite fiber consisting of fiber forming components of 0.01 to about 0.9 denier and an extraction component as a yarn of the front surface layer. If the extraction component is removed from the composite fiber, the fiber-forming component with monofilament denier of 0.01 to about 0.9 denier is only left. If the monofilament denier of the yarn at the front surface layer is more than 0.9 denier, its soft touch is poor and the writing effect is not revealed. If the monofilament denier of the yarn at the front surface layer is less than 0.01 denier, its soft touch is maintained, but its appearance is poor since the raised fibers are omitted or entangled due to friction.

It is preferable that the density of the yarn at the front surface layer is increased in order to improve the touch of the warp knit. It is possible for increasing the density of the yarn at the front surface layer to reduce the content of the extraction component in the composite fiber during the manufacturing stage; however, it is curbed technically in the spinning process, and there are limitations to increasing the density thereof even if the content of the extraction component in the composite fiber is reduced.

The content of the extraction component in the composite fiber is generally 20 to about 40 % by weight.

Accordingly, it is more preferable for increasing the density of fiber at the front surface layer to use high shrinkage yarn as a yarn of the rear surface layer.

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It is preferable that polyester is used as the fiber- forming component and copolyester with excellent alkali hydrolysis property is used as the extraction component of the composite fiber used as yarn of the front surface layer.

Next, synthetic yarn or high shrinkage yarn with monofilament denier of 1 to about 5 denier is used as the yarn of the rear surface layer. If the monofilament denier of the yarn at the rear surface layer is less than 1 denier, draping property of the warp knit is decreased. If the monofilament denier of the yarn at the rear surface layer is more than 5 denier, warping property and knitting property of the warp knit are deteriorated.

The high shrinkage yarn, which is used as the yarn of the rear surface layer, preferably has the shrinkage rate in boiling water of 15 to about 50 % and the stress of the heat shrinkage of 0.2 grams/denier or more. If the shrinkage rate in boiling water is less than 15 %, it is not possible to increase the density of ultra fine yarn, which is the yarn of the front surface layer, and thus the touch is poor since the shrinkage is extremely low. If the shrinkage rate of boiling water is more than 50 %, it is possible to increase the density of ultra fine yarn, which is the yarn of the front surface layer; however, it is hard to control the process width of the finished warp knit since the shrinkage is extremely high. Furthermore, if the stress of the heat shrinkage is less than 0.2 grams/denier, the stress between the structural points is not overcome even if the shrinkage rate in boiling water is high, and therefore sufficient shrinkage is not provided.

Copolyester is preferably used as the high shrinkage yarn as mentioned above.

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Co-polymer components include bisphenol-A, polyethyleneglycol, isophthalic acid or the like. However, the present invention is not limited to the co-polymer components as described above.

Also, the present invention uses a synthetic yarn with monofilament denier of 1 to about 5 denier as a yarn of the rear surface layer. The synthetic yarn is polyester filament or polyamide filament, more preferable polyester filament. If the monofilament denier of the yarn at the rear surface layer is less than 1 denier, it is impossible to add proper repulsion to warp knit. If the monofilament denier of the yarn at the rear surface layer is more than 5 denier, the process of warping and knitting are difficult, and touch of the warp knit is deteriorated because repulsion of warp knit is increased too much.

The content of yarn of the rear surface layer when it is knitted is preferably 15 to about 60 % in weight of the total weight of the processed warp knit. If the content of the yarn at the rear surface layer is less than 15% in weight, draping property is deteriorated. If the content of the yarn at the rear surface layer more than 60% in weight, the touch is deteriorated.

The content of the yarn of the front surface layer when it is knitted is preferably 40 to about 85 % by weight of the total weight of the processed warp knit. If the content of the yarn of the front surface layer is less than 40 % in weight, the touch of the warp knit is poor. If the content of the yarn of the front surface layer is more than 85 % in weight, the draping property and the mechanical property of the warp knit is deteriorated.

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The present invention is characterized in that such a raw warp knit as mentioned above is raised so that the shrinkage rate of the raw warp knit is 40 % or more before preliminary heat treatment of the raw warp knit. After the raw warp knit is raised according to the present invention, it is preliminarily heat-treated as usual, and it is treated in alkali solution, thereby the extraction component is removed from the composite fiber. After that, the warp knit is dyed, buffered and finally heat-treated.

As the present invention uses the extraction type composite fiber as the yarn of the front surface layer, the warping and knitting property is excellent. And as the extraction component of composite fiber is extracted in after-process, the yarn of the front surface layer is fined. As a result, the warp knit of the present invention has excellent touch and writing effect.

Meanwhile the warp knit of the present invention is composed densely out of ultra fine yarn with monofilament denier of 0.01 to about 0.9 denier, whereby its touch and appearance are very excellent. Especially, as the warp knit of the present invention includes the rear surface layer consisting of high shrinkage yarn with 15 to about 50% of shrinkage rate in boiling water, the density of the ultra fine yarn at the front surface layer is higher, and recovery rate of elongation of a warp knit in the directions of the wale and the course is 8 to about 30 %, which represents excellence. Also, as the warp knit of the present invention includes 15 to about 60% in weight of the rear surface layer consisting of the high shrinkage yarn, the touch and the draping property of the warp knit are

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excellent.

Also, the warp knit of the present invention, using the synthetic yarn with proper denier as the yarn of the rear surface layer, can solve the problem of the touch of warp knit prepared by two component extraction fiber being too soft. And the above-mentioned warp knit has excellent draping property and raising property.

As described in detail above, the warp knit of the present invention has excellent touch, appearance, and draping property, and thus it is suitable for materials of ladies' clothes or materials of artificial leathers.

The properties of the warp knit according to the present invention are evaluated as follows:

Softness

Softness of the warp knit is evaluated from sensitive examination by ten specialists. If more than eight specialists determine that the warp knit is soft, it is excellent. If five to about seven specialists determine that the warp knit is soft, it is ordinary. If more than eight specialists determine that the warp knit is not soft, it is poor.

Draping property

Draping property of the warp knit is evaluated from sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has draping property, it is excellent. If five to about seven specialists determine that the warp knit has draping property, it is ordinary. If more than eight specialists determine that the warp knit

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has poor draping property, it is poor.

Writing effect

Writing effect of the warp knit is evaluated from sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has writing effect, it is excellent. If five to about seven specialists determine that the warp knit has writing effect, it is ordinary. If more than eight specialists determine that the warp knit has poor writing effect, it is poor.

Appearance

Appearance of the warp knit is evaluated from sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has good appearance, it is excellent. If five to about seven specialists determine that the warp knit has good appearance, it is ordinary. If more than eight specialists determine that the warp knit has poor appearance, it is poor.

Shrinkage rate of boiling water

Shrinkage rate of boiling water is measured according to JIS-L-1073 methods.

Recovery rate of elongation (%)

Total measurement is carried out according to KSK 08125, but proper elongation length when being elongated at the constant velocity is output by using JIS L 1096. Both ends of a sample of the warp knit with length of 10 cm and width of 15 cm are fixed to Instron. The warp knit is elongated constantly at the stretching velocity of 100 mm/min

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until the load of 750 g is reached. The warp knit is left as it is with the load being removed. Next, the warp knit is elongated at the constant velocity up to the original position. And then, the warp knit is left as it is for three minutes with the load being removed. The above process is repeatedly carried out five times. Finally, the elongated length L and the free elongated length L_1 are measured. The free elongated length L_1 is obtained by subtraction of the length measured after the warp knit is left as it is from the elongated length L (See Fig. 1). The recovery rate of elongation is obtained by putting the elongated length (L) and the free elongated length (L_1) in the following equation:

Recovery rate of elongation (%) = [elongated length (L) - free elongated length (L_1)]/elongated length (L) $\times$ 100

Warping property

Warping property is evaluated by checking the stop times/hour of warping machine due to yarn defect. If the stop times/hour is naught, it is excellent. If the stop times/hour is one or two, it is ordinary. If the stop times/hour is more than 3 times, it is poor. The stop times/hour of warping machine is calculated by dividing the total stop times of warping machine in warping the yarn of 9kg into total warping time.

Knitting property

Knitting property is evaluated by checking the stop times/hour of knitting machine due to yarn defect. If the stop times/hour is naught, it is excellent. If the stop times/hour is one or two, it is ordinary. If the stop times/hour is more than 3 times, it is

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poor. The stop times/hour of knitting machine is calculated by dividing the total stop times of knitting machine in a day into 24hour.

Raising property

Raising property of warp knit is evaluated from sensitive examination. If the raising of warp knit is finished well by passing through the raising machine 8 times at speed of 15m/minute, it is excellent. If the raising of warp knit is finished well by passing through the raising machine 10 times at speed of 15m/minute, it is ordinary. If the raising of warp knit is finished well by passing through the raising machine more then 10 times at speed of 15m/minute, it is poor.

The present invention is now understood more concretely by comparison between examples of the present invention and comparative examples. However, the present invention is not limited to such examples.

Example 1

At first, the raw warp knit with density of 23 course/centimeter is prepared by using an extraction type composite fiber, in which the fiber forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepar 0.05

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denier of ultra fine yarn after removing the extraction component, and is used as a yarn of the front surface layer, and then using copolyester yarn with mono filament of 5 denier and shrinkage rate in boiling water of 28% (high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 26% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit with raising machine until the shrinkage of the warp knit has reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution (1% concentration) for 30 minutes at 98℃ in order to remove the extraction component of the composite fiber. And then a processed warp knit is prepared by dyeing (with disperse dyes), buffing and heating at 180℃ to finally obtain the above mentioned warp knit. And then, the properties of the processed warp knit are evaluated using the above-mentioned methods. The results of the evaluation are shown in Table 1.

Example 2

At first, the raw warp knit with density of 23 course/centimeter is prepared by using an extraction type composite fiber, in which the fiber forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepare 0.07 denier of ultra fine yarn after removing the extraction component, and is used as a yarn of the front surface layer, and then using copolyester yarn with monofilament of 3 denier

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and shrinkage rate in boiling water of 34% (high shrinkage yarn) as a yarn of the rear surface layer. At this time, the content of the yarn of the rear surface layer is 31% in weight to the total weight of processed warp knit. Next, the manufactured raw warp knit is treated with a raising machine until the shrinkage of the warp knit has reached 55%. And then, after heating the warp knit at 190℃ preliminarily, the warp knit is dipped in NaOH solution (1% concentration) for 30 minutes at 98℃ in order to remove the extraction component of the composite fiber. And then a processed warp knit is prepared by dyeing (with disperse dyes), buffing and heating at 180℃ to finally obtain the above-mentioned warp knit. And then, the properties of the processed warp knit is evaluated using the above-mentioned methods. The results of the evaluation are shown in Table 1.

Example 3

At first, the raw warp knit with density of 23 course/centimeter is prepared by using an extraction type composite fiber, in which the fiber forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepare 0.04 denier of ultra fine yarn after removing the extraction component, and used as a yarn of the front surface layer, and then using copolyester yarn with monofilament of 2.5 denier and shrinkage rate in boiling water of 28% (high shrinkage yarn) as a yarn of the rear

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surface layer. At this time, content of the yarn of the rear surface layer is 55% in weight to the total weight of processed warp knit. Next, the manufactured raw warp knit is treated with a raising machine until the shrinkage of the warp knit has reached 50%. And then, after heating the warp knit at 190℃ preliminarily, the warp knit is dipped in NaOH solution (1% concentration) for 30 minutes at 98℃ in order to remove the extraction component of the composite fiber. And then a processed warp knit is prepared by dyeing (with disperse dyes), buffing and heating at 180℃ to finally obtain the above-mentioned warp knit. And then, the properties of the processed warp knit are evaluated as above-mentioned methods. The results of the evaluation are shown in Table 1.

Example 4

At first, the raw warp knit with density of 23 course/centimeter is prepared by using an extraction type composite fiber, in which the fiber forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepare 0.2 denier of ultra fine yarn after removing the extraction component, and used as a yarn of the front surface layer, and then using copolyester yarn with monofilament of 5 denier and shrinkage rate in boiling water of 28% (high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 26% in weight

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to the total weight of processed warp knit. Next, the manufactured raw warp knit is treated with a raising machine until the shrinkage of the warp knit has reached 55%. And then, after heating the warp knit at 190℃ preliminarily, the warp knit is dipped in NaOH solution (1% concentration) for 30 minutes at 98℃ in order to remove the extraction component of the composite fiber. And then a processed warp knit is prepared by dyeing (with disperse dyes), buffing and heating at 180℃ to finally obtain the above mentioned warp knit. And then, the properties of the processed warp knit are evaluated as in the above-mentioned methods. The results of the evaluation are shown in Table 1.

Comparative Example 1

At first, the raw warp knit with density of 23 course/centimeter is prepared by using an extraction type composite fiber, in which the fiber forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepare 0.05 denier of ultra fine yarn after removing the extraction component, and used as a yarn of the front surface layer, and then using copolyester yarn with monofilament of 0.5 denier and shrinkage rate in boiling water of 40% (high shrinkage yarn) as a yarn of the rear surface layer. At this time, the content of the yarn of the rear surface layer is 48% in weight to the total weight of processed warp knit. Next, the manufactured raw warp knit is treated with a raising machine until the shrinkage of the warp knit has reached 50%.

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And then, after heating the warp knit at 190℃ preliminarily, the warp knit is dipped in NaOH solution (1% concentration) for 30 minutes at 98℃ in order to remove the extraction component of the composite fiber. And then a processed warp knit is prepared by dyeing (with disperse dyes), buffing and heating at 180℃ to finally obtain the above-mentioned warp knit. And then, the properties of the processed warp knit are evaluated as in the above-mentioned methods. The results of the evaluation are shown in Table 1.

Comparative Example 2

At first, the raw warp knit with density of 23 course/centimeter is prepared by using an extraction type composite fiber, in which the fiber forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepare 0.05 denier of ultra fine yarn after removing the extraction component, and used as the yarn of the front surface layer, and then using polyester yarn with monofilament of 20 denier as the yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 42% in weight to the total weight of processed warp knit. Next, the manufactured raw warp knit is treated with a raising machine until the shrinkage of the warp knit has reached 50%. And then, after heating the warp knit at 190℃ preliminarily, the warp knit is dipped in NaOH solution (1% concentration) for 30 minutes at 98℃ in

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order to remove the extraction component of the composite fiber. And then a processed warp knit is prepared by dyeing (with disperse dyes), buffing and heating at 180℃ to finally obtain the above mentioned warp knit. And then, the properties of the processed warp knit are evaluated as in the above-mentioned methods. The results of the evaluation are shown in Table 1.

Comparative Example 3

At first, the raw warp knit with density of 23 course/centimeter is prepared by using an extraction type composite fiber, in which the fiber forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepar 1.3 denier of ultra fine yarn after removing the extraction component, and used as the yarn of the front surface layer, and then using polyester yarn with monofilament of 20 denier as the yarn of the rear surface layer. At this time, the content of the yarn of the rear surface layer is 42% in weight to the total weight of processed warp knit. Next, the manufactured raw warp knit is treated with a raising machine until the shrinkage of the warp knit has reached 50%. And then, after heating the warp knit at 190℃ preliminarily, the warp knit is dipped in NaOH solution (1% concentration) for 30 minutes at 98℃ in order to remove the extraction component of the composite fiber. And then a processed warp knit is prepared by dyeing with disperse dyes), buffing and heating at 180℃ to

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Appendix A: Marked-up Version of Substitute Specification

A WARP KNIT HAVING AN EXCELLENT TOUCH, AND A PROCESS OF PREPARING THE SAME

This application claims priority to PCT/KR00/01202 filed Nov. 30, 2000, and to Republic of Korea patent applications 1999/58119 filed Dec. 16, 1999; 2000/54839 filed September 19, 2000; 2000/54840 filed September 19, 2000.

~~TECHNICAL~~ FIELD OF THE INVENTION

The present invention relates to a warp knit having excellent touch and a process of preparing such a warp knit.

More particularly, the present invention relates to a warp knit with softness and draping property due to its very fine structure and thus useful for materials of artificial leathers or ladies' clothes, and a process of preparing such a warp knit.

BACKGROUND ~~ART~~ OF THE INVENTION

If ~~a~~ fiber becomes fined, its bending strength becomes weakened. Accordingly, since fabrics produced with ultra fine fiber have very soft touch, researches in connection with producing such ultra fine fiber on a commercial scale are developing very actively. Also, development of the technology ~~which is~~ capable of producing extremely fine synthetic yarn ~~extremely finely~~ leads to great improvement of the value of the goods of sensitive materials for clothes.

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Generally, ~~a~~ the process of preparing ultra fine fiber is divided into three processes: a direct spinning process; a two components division type spinning process; and a two components extraction type spinning process. In the direct spinning process, it is possible to prepare ultra fine fiber of 0.3~~-~~ to about 0.5 denier. In the two components division type spinning process, it is possible to prepare ultra fine fiber of _0.2 denier. In the two components extraction type spinning process, it is possible to prepare ultra fine fiber of 0.01 denier or ~~below~~less.

~~In case that the~~When ultra fine fiber prepared by means of the direct spinning process is applied to a warp knit, warping property and appearance of the warp knit is very poor since numerous filaments are scattered. Furthermore, the warp knit thus prepared is very inferior ~~in~~ to touch and writing effect.

~~In case that the~~When ultra fine fiber prepared by means of the two components division type composite spinning process consisting of nylon/polyester is applied to a warp knit, warping property and knitting property of the warp knit is very poor since the nylon is isolated from the polyester by means of the tension and friction in warping and knitting. Furthermore, appearance of the prepared product is very poor due to limit of the denier of the ultra fine fiber.

~~In case that~~When the composite fiber of 0.05 denier or ~~below~~ less prepared by means of the two components extraction type spinning process is applied to a warp knit, warping property, knitting property and touch of the warp knit are good; however, density

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in the structure of the warp knit is loosened and thus appearance of the warp knit is poor since the extraction component is extracted at the following processing step for producing ~~in~~ the ultra fine fiber.

Producing goods with ultra fine fiber ~~are~~ is developing in variety in connection with textile applications. However, producing goods with ultra fine fiber ~~are~~ is not developing in connection with knitting applications since the poor warping property and the several drawbacks generated at ~~the following~~ processing step as mentioned above.

Accordingly, it is an object of the present invention to prepare a warp knit, which has excellent touch, shape stability, and appearance, and thus is suitable for materials of ladies' clothes, with good warping property and knitting property.

~~DISCLOSURE~~ SUMMARY OF THE INVENTION

The present invention provides a warp knit which has excellent touch, shape stability, flexibility, and appearance, and thus is suitable for materials of ladies' clothes. The present invention also provides a process of preparing such a warp knit with good warping property and knitting property.

More particularly, the present invention relates to a warp knit having excellent touch, consist of a front surface layer and a rear surface layer, the front surface layer consisting of ultra fine yarn with mono-filament denier of 0.01~~-~~ to about 0.9 denier, the rear surface layer consisting of synthetic yarn or high shrinkage yarn with mono-filament

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denier of 1~~—~~to about 5 denier, wherein the recovery rate of elongation in the directions of wale and course is 8~~—~~to about 30 %.

The present invention also relates to a process of preparing a warp knit having excellent touch, characterized ~~in that~~by knitting a warp knit by using a composite fiber consisting of a fiber formation component of 0.01~~—~~to about 0.9 denier and an extraction component as a yarn of ~~a~~ the front surface layer, and a synthetic yarn or high shrinkage yarn with mono-filament of 1~~—~~to about 5 denier as a yarn of a rear surface layer, and then raising the warp knit until the shrinkage rate of the warp knit ~~is~~ has reached 40% or more, and then ~~preliminarily~~ pre-heating, extracting the extraction component from the composite fiber, dyeing, buffing, and finally heating the warp knit continuously.

BRIEF DESCRIPTION OF THE DRAWINGS

The preferred embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a graph showing recovery rate of elongation of a warp knit measured using an Instron in accordance with the present invention.

~~The present invention will now be described in more detail.~~ DETAILED DESCRIPTION OF THE INVENTION

The inventors of the present application accomplished the present invention, by taking

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notice of the fact that the selection and the combination of the materials in designing the structure of the fabric is very important in order to prepare polyester warp knit which is as soft as natural suede and which has excellent appearance as well as excellent warping property and knitting property.

First of all, the present invention uses a composite fiber consisting of fiber formationforming components of 0.01 to about 0.9 denier and an extraction component as a yarn of the front surface layer. If the extraction component is removed from the composite fiber, the fiber formation forming component with mono-filament denier of 0.01 to about 0.9 denier is only remainedleft. If the mono-filament denier of the yarn at the front surface layer is more than 0.9 denier, its soft touch is poor and the writing effect is not revealed. If the mono-filament denier of the yarn at the front surface layer is less than 0.01 denier, its soft touch is maintained, but its appearance is poor since the raised fibers are omitted or entangled due to friction.

It is preferable that the density of the yarn at the front surface layer is increased in order to improve the touch of the warp knit. It is possible for increasing the density of the yarn at the front surface layer to reduce the content of the extraction component in the composite fiber during the manufacturing stage; however, it is curbed technically in the spinning process, and there are limitations in to increasing the density thereof even if the content of the extraction component in the composite fiber is reduced.

The content of the extraction component in the composite fiber is generally 20 to about 40 % in by weight.

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Accordingly, it is more preferable for increasing the density of fiber at the front surface layer to use high shrinkage yarn as a yarn of the rear surface layer.

It is preferable that polyester is used as the fiber ~~formation~~ forming component and copolyester with excellent alkali hydrolysis property is used as the extraction component of the composite fiber used as yarn of the front surface layer.

Next, synthetic yarn or high shrinkage yarn with mono-filament denier of 1 ~~-~~ to about 5 denier ~~are~~ is used as the yarn of the rear surface layer. If the mono-filament denier of the yarn at the rear surface layer is less than 1 denier, draping property of the warp knit is decreased. If the mono-filament denier of the yarn at the rear surface layer is more than 5 denier, warping property and knitting property of the warp knit are deteriorated.

The high shrinkage yarn, which ~~are~~ is used as the yarn of the rear surface layer, preferably ~~have~~ has the shrinkage rate of boiling water of 15 ~~-~~ to about 50 % and the stress of the heat shrinkage of 0.2 ~~g/d~~grams/denier or more. If the shrinkage rate ~~of~~ in boiling water is less than 15 %, it is not possible to increase the density of ultra fine yarn, which ~~are~~ is the yarn of the front surface layer, and thus the touch is poor since the shrinkage is extremely low. If the shrinkage rate of boiling water is more than 50 %, it is possible to increase the density of ultra fine yarn, which ~~are~~ is the yarn of the front surface layer; however, it is hard to control the process width of the finished warp knit since the shrinkage is extremely high. Furthermore, if the stress of the heat shrinkage is less than 0.2 ~~g/d~~grams/denier, the stress between the structural points is not overcome even if the

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shrinkage rate ~~of~~ in boiling water is high, and therefore sufficient shrinkage is not provided.

Copolyester is preferably used as the high shrinkage yarn as mentioned above. Co-polymer components include bisphenol-A, polyethyleneglycol, isophthalic acid or the like. However, the present invention is not limited to the co-polymer components as described above.

Also, the present invention use a synthetic yarn with mono-filament denier of 1~~–~~ to about 5 denier as a yarn of the rear surface layer. The synthetic yarn is polyester filament or polyamide filament, more preferable polyester filament. If the mono-filament denier of the yarn at the rear surface layer is less than 1 denier, it is impossible to add proper repulsion to warp knit. If the mono-filament denier of the yarn at the rear surface layer is more than 5 denier, the process of warping and knitting are difficult, and touch of the warp knit ~~are~~ is deteriorated because repulsion of warp knit is increased too much.

The content of yarn of the rear surface layer when it is knitted is preferably 15~~–~~ to about 60 % in weight of the total weight of the processed warp knit. If the content of the yarn at the rear surface layer is less than 15% in weight, draping property is deteriorated. If the content of the yarn at the rear surface layer more than 60% in weight, the touch is deteriorated.

The content of the yarn of the front surface layer when it is knitted is preferably

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40--to about 85 % ~~in~~ by weight of the total weight of the processed warp knit. If the content of the yarn of the front surface layer is less than 40 % in weight, the touch of the warp knit is poor. If the content of the yarn of the front surface layer is more than 85 % in weight, the draping property and the mechanical property of the warp knit is deteriorated.

The present invention is characterized in that such a raw warp knit as mentioned above is raised so that the shrinkage rate of the raw warp knit is 40 % or more before preliminary heat treatment of the raw warp knit. After the raw warp knit is raised according to the present invention, it is preliminarily heat-treated as usual, and it is treated in alkali solution, thereby the extraction component is removed from the composite fiber. After that, the warp knit is dyed, buffered and finally heat-treated.

As the present invention uses the extraction typed composite fiber as the yarn of the front surface layer, the warping and knitting property is excellent. And as the extraction component of composite fiber is extracted in after-process, the yarn of the front surface layer is fined. As a result, the warp knit of the present invention has excellent touch and writing effect.

Meanwhile the warp knit of the present invention is composed densely out of ultra fine yarn with mono-filament denier of 0.01--to about 0.9 denier, whereby its touch and appearance are very excellent. Especially, as the warp knit of the present invention includes the rear surface layer consisting of high shrinkage yarn with 15-- to about 50% of shrinkage rate ~~of~~ in boiling water, the density of the ultra fine yarn at the front surface

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layer is higher, and recovery rate of elongation of a warp knit in the directions of the wale and the course is 8--to about 30 %, which represents excellence. Also, as the warp knit of the present invention includes 15-- to about 60% in weight of the rear surface layer consisting of the high shrinkage yarn, the touch and the draping property of the warp knit are excellent.

Also, the warp knit of the present invention , ~~used~~ using the synthetic yarn with proper denier as the yarn of the rear surface layer, can solve the problem ~~that~~ of the touch of warp knit prepared by two component extraction fiber ~~is soft too much~~being too soft. And the above--mentioned warp knit has excellent draping property and raising property.

As described in detail above, the warp knit of the present invention has excellent touch, appearance, and draping property, and thus it is suitable for materials of ladies' clothes or materials of artificial leathers.

The properties of the warp knit according to the present invention are evaluated as follows:

Softness

Softness of the warp knit is evaluated from ~~the~~ sensitive examination by ten specialists. If more than eight specialists determine that the warp knit is soft, it is excellent. If five--to about seven specialists determine that the warp knit is soft, it is ordinary. If more than eight specialists determine that the warp knit is not soft, it is poor.

Draping property

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Draping property of the warp knit is evaluated from ~~the~~ sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has draping property, it is excellent. If five ~~—~~ to about seven specialists determine that the warp knit has draping property, it is ordinary. If more than eight specialists determine that the warp knit has poor draping property, it is poor.

Writing effect

Writing effect of the warp knit is evaluated from ~~the~~ sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has writing effect, it is excellent. If five ~~—~~ to about seven specialists determine that the warp knit has writing effect, it is ordinary. If more than eight specialists determine that the warp knit has poor writing effect, it is poor.

Appearance

Appearance of the warp knit is evaluated from ~~the~~ sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has good appearance, it is excellent. If five ~~—~~ to about seven specialists determine that the warp knit has good appearance, it is ordinary. If more than eight specialists determine that the warp knit has poor appearance, it is poor.

Shrinkage rate of boiling water

Shrinkage rate of boiling water is measured according to JIS-L-1073 methods.

Recovery rate of elongation (%)

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Total measurement is carried out according to KSK 08125, but proper elongation length when being elongated at the constant velocity is output by using JIS L 1096. Both ends of a sample of the warp knit with length of 10 cm and width of 15 cm are fixed to Instron. The warp knit is elongated constantly at the stretching velocity of 100 mm/min until the load of 750 g is reached. The warp knit is left as it is with the load being removed. Next, the warp knit is elongated at the constant velocity up to the original position. And then, the warp knit is left as it is for three minutes with the load being removed. The above process is repeatedly carried out five times. Finally, the elongated length L and the free elongated length L_1 are measured. The free elongated length L_1 is obtained by subtraction of the length measured after the warp knit is left as it is from the elongated length L (See Fig. 1). The recovery rate of elongation is obtained by putting the elongated length (L) and the free elongated length (L_1) in the following equation:

recovery rate of elongation (%) = [elongated length (L) - free elongated length (L_1)]/elongated length (L) × 100

Warping property

Warping property is evaluated by checking the stop times/hour of warping machine due to yarn defect. If the stop times/hour is naught, it is excellent. If the stop times/hour is one or two, it is ordinary. If the stop times/hour is more than 3 times, it is poor. The stop times/hour of warping machine is calculated by dividing the total stop times of warping machine in warping the yarn of 9kg into total warping time.

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Knitting property

Knitting property is evaluated by checking the stop times/hour of knitting machine due to yarn defect. If the stop times/hour is naught, it is excellent. If the stop times/hour is one or two, it is ordinary. If the stop times/hour is more than 3 times, it is poor. The stop times/hour of knitting machine is calculated by dividing the total stop times of knitting machine in a day into 24hour.

Raising property

Raising property of warp knit is evaluated from ~~the~~ sensitive examination. If the raising of warp knit is finished well by passing through the raising machine 8 times at speed of 15m/minute, it is excellent. If the raising of warp knit is finished well by passing through the raising machine 10 times at speed of 15m/minute, it is ordinary. If the raising of warp knit is finished well by passing through the raising machine more then 10 times at speed of 15m/minute, it is poor.

~~BRIEF DESCRIPTION OF THE DRAWINGS~~

~~The preferred embodiment of the present invention will now be described by way of example with reference to the accompanying drawings in which:~~

~~Fig. 1 is a graph showing recovery rate of elongation of a warp knit measured using an Instron in accordance with the present invention.~~

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~~BEST MODE FOR CARRYING OUT THE INVENTION~~

The present invention is now understood more concretely by comparison between examples of the present invention and comparative examples. However, the present invention is not limited to such examples.

Example 1

At first, ~~prepare~~ the raw warp knit with density of 23~~C/Cm~~course/centimeter ~~is~~ prepared by using an extraction type composite fiber, in which the fiber ~~formation~~ forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to ~~prepared~~ 0.05 denier of ultra fine yarn after removing the extraction component, and is used as a yarn of the front surface layer, and then using copolyester yarn with mono filament of 5 denier and shrinkage rate ~~of~~ in boiling water of 28% (high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 26% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit ~~by~~ with raising machine ~~until~~ the shrinkage of the warp knit ~~is~~ has reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution (1% concentration) ~~during~~ for 30 minutes at 98℃ in ~~other~~ order to remove the extraction component of the composite fiber. And then ~~prepare~~ a processed warp knit is prepared by dyeing (with disperse dyes), buffing and

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heating at 180℃ to finally obtain the above mentioned warp knit. And then, ~~evaluate~~ the properties of the processed warp knit are evaluated~~as~~ using the above mentioned methods. The results of ~~-~~evaluation ~~were~~ are ~~indicated~~ shown in Table 1.

Example 2

At first, ~~prepare~~ the raw warp knit with density of 23~~C/Cm~~course/centimeter ~~is~~ prepared by using an extraction type composite fiber, in which the fiber ~~formation~~ forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to ~~prepared~~ 0.07 denier of ultra fine yarn after removing the extraction component, and is used as a yarn of the front surface layer, and then using copolyester yarn with mono-filament of 3 denier and shrinkage rate ~~of~~ in boiling water of 34% (high shrinkage yarn) as a yarn of the rear surface layer. At this time, the content of the yarn of the rear surface layer is 31% in weight to the total weight of processed warp knit. Next, ~~treat~~ the manufactured raw warp knit is treated ~~by~~ with a raising machine ~~untill~~ the shrinkage of the warp knit ~~is~~ has reached 55%. And then, after heating the warp knit at 190℃ preliminarily, ~~dipping~~ the warp knit is dipped in NaOH solution (1% concentration) ~~during~~ for 30 minutes at 98℃ in ~~other~~ order to remove the extraction component of the composite fiber. And then ~~prepare~~ a processed warp knit is prepared by dyeing (with disperse dyes), buffing and heating at 180℃ to finally obtain the above-

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mentioned warp knit. And then, ~~evaluate~~ the properties of the processed warp knit is evaluated using theas above-mentioned methods. The results of the evaluation ~~were~~ are ~~indicated~~ shown in Table 1.

Example 3

At first, ~~prepare~~ the raw warp knit with density of 23~~C/Cm~~course/centimeter is prepared by using an extraction type composite fiber, in which the fiber ~~formation~~ forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepare~~ed~~ 0.04 denier of ultra fine yarn after removing the extraction component, and used as a yarn of the front surface layer, and then using copolyester yarn with mono-filament of 2.5 denier and shrinkage rate ~~of~~ in boiling water of 28% (high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 55% in weight to the total weight of processed warp knit. Next, ~~treat~~ the manufactured raw warp knit is treated with a ~~by~~ raising machine untill the shrinkage of the warp knit ~~is~~ has reached 50%. And then, after heating the warp knit at 190℃ preliminarily, ~~dipping~~ the warp knit is dipped in NaOH solution (1% concentration) ~~during~~ for 30 minutes at 98℃ in ~~other~~ order to remove the extraction component of the composite fiber. And then ~~prepare~~ a processed warp knit is prepared by dyeing(with disperse dyes), buffing and heating at 180℃ to finally obtain the above-mentioned warp

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knit. And then, ~~evaluate~~ the properties of the processed warp knit are evaluated as above mentioned methods. The results of the evaluation ~~were indicated~~are shown in Table 1.

Example 4

At first, ~~prepare~~ the raw warp knit with density of 23~~C/Cm~~course/centimeter~~-~~is prepared by using an extraction type composite fiber, in which the fiber ~~formation~~ forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepared~~d~~ 0.2 denier of ultra fine yarn after removing the extraction component, and used as a yarn of the front surface layer, and then using copolyester yarn with mono-filament of 5 denier and shrinkage rate ~~of~~ in boiling water of 28% (high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 26% in weight to the total weight of processed warp knit. Next, ~~treat~~ the manufactured raw warp knit is treated with~~by~~ a raising machine untill the shrinkage of the warp knit ~~is~~ has reached 55%. And then, after heating the warp knit at 190℃ preliminarily, ~~dipping~~ the warp knit is dipped in NaOH solution (1% concentration) ~~during~~ for 30 minutes at 98℃ in ~~other~~ order to remove the extraction component of the composite fiber. And then ~~prepare a~~ processed warp knit is prepared by dyeing (with disperse dyes), buffing and heating at 180℃ to finally obtain the above mentioned warp

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knit. And then, ~~evaluate~~ the properties of the processed warp knit are evaluated as in the above-mentioned methods. The results of the evaluation ~~were~~ are ~~indicated~~ shown in Table 1.

Comparative Example 1

At first, ~~prepare~~ the raw warp knit with density of 23~~C/Cm~~course/centimeter is prepared by using an extraction type composite fiber, in which the fiber ~~formation~~ forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepared 0.05 denier of ultra fine yarn after removing the extraction component, and used as a yarn of the front surface layer, and then using copolyester yarn with mono-filament of 0.5 denier and shrinkage rate ~~of~~ in boiling water of 40% (high shrinkage yarn) as a yarn of the rear surface layer. At this time, the content of the yarn of the rear surface layer is 48% in weight to the total weight of processed warp knit. Next, ~~treat~~ the manufactured raw warp knit is treated with a ~~by~~ raising machine untill the shrinkage of the warp knit ~~is~~ has reached 50%. And then, after heating the warp knit at 190℃ preliminarily, ~~dipping~~ the warp knit is dipped in NaOH solution (1% concentration) ~~during~~ for 30 minutes at 98℃ in ~~other~~ order to remove the extraction component of the composite fiber. And then ~~prepare~~ a processed warp knit is prepared by dyeing (with disperse dyes), buffing and heating at 180℃ to finally obtain the above-

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mentioned warp knit. And then, ~~evaluate~~ the properties of the processed warp knit are evaluated as in the above-mentioned methods. The results of the evaluation ~~were~~ are ~~indicated~~ shown in Table 1.

Comparative Example 2

At first, ~~prepare~~ the raw warp knit with density of 23~~C/Cm~~course/centimeter ~~is~~ prepared by using an extraction type composite fiber, in which the fiber ~~formation~~ forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepare~~d~~ 0.05 denier of ultra fine yarn after removing the extraction component, and used as ~~a~~ the yarn of the front surface layer, and then using polyester yarn with mono filament of 20 denier as ~~a~~ the yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 42% in weight to the total weight of processed warp knit. Next, ~~treat~~ the manufactured raw warp knit is treated with a ~~by~~ raising machine untill the shrinkage of the warp knit ~~is~~ has reached 50%. And then, after heating the warp knit at 190℃ preliminarily, ~~dipping~~ the warp knit is dipped in NaOH solution (1% concentration) ~~during~~ for 30 minutes at 98℃ in ~~other~~ order to remove the extraction component of the composite fiber. And then ~~prepare~~ a processed warp knit is prepared by dyeing(with disperse dyes), buffing and heating at 180℃ to finally obtain the above mentioned warp knit. And then, ~~evaluate~~ the properties of the

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processed warp knit are evaluated as in the above-mentioned methods. The results of the evaluation ~~were~~ are ~~indicated~~ shown in Table 1.

Comparative Example 3

At first, ~~prepare~~ the raw warp knit with density of 23~~C/Cm~~course/centimeter ~~is~~ prepared by using an extraction type composite fiber, in which the fiber ~~formation~~ forming component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is used to prepare~~d~~ 1.3 denier of ultra fine yarn after removing the extraction component, and used as ~~a~~ the yarn of the front surface layer, and then using polyester yarn with mono-filament of 20 denier as ~~a~~ the yarn of the rear surface layer. At this time, the content of the yarn of the rear surface layer is 42% in weight to the total weight of processed warp knit. Next, ~~treat~~ the manufactured raw warp knit is treated with a ~~by~~ raising machine until the shrinkage of the warp knit ~~is~~ has reached 50%. And then, after heating the warp knit at 190℃ preliminarily, ~~dipping~~ the warp knit is dipped in NaOH solution (1% concentration) ~~during~~ for 30 minutes at 98℃ in ~~other~~ order to remove the extraction component of the composite fiber. And then ~~prepare~~ a processed warp knit is prepared by dyeing(with disperse dyes), buffing and heating at 180℃ to finally obtain the above-mentioned warp knit. ~~-~~And then, ~~evaluate~~ the properties of the processed warp knit are evaluated as in the above-mentioned methods. The results of

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the evaluation ~~were~~ are ~~indicated~~ shown in Table 1.

Comparative Example 4

Except for using the ultra fine polyester yarn with mono-filament of 0.04 denier, made by direct spinning, as the yarn of the front surface layer, ~~prepare~~ a warp knit is prepared by same process and condition as ~~example~~ Example 1. And then, ~~evaluate~~ the properties of the processed warp knit are evaluated as in the above-mentioned methods. The results of the evaluation ~~were~~ are ~~indicated~~ shown in Table 1.

Table 1: Results of property evaluation of warp knit

Class		Example				Comparative example			
		1	2	3	4	1	2	3	4
Softeness		E	E	E	E	O	P	P	E
Draping property		E	E	E	O	P	E	O	O
Writing effect		E	E	E	E	E	P	P	P
Appearance		E	E	O	O	O	O	P	O
Warping property		E	E	E	E	E	E	O	P
Knitting property		E	E	E	E	O	E	E	P
Raising property		O	O	O	E	O	O	P	P
Recovery rate of elongation (%)	In the direction of wale	20.01	12.36	18.00	16.27	19.77	10.40	14.88	7.87
	In the direction of course	18.57	13.00	15.23	15.33	17.23	13.26	16.29	6.90

(The E means excellent, O means ordinary and P means poor in the table 1)

~~INDUSTRIAL APPLICABILITY~~

As described above, the warp knit according to the present invention has excellent touch, appearance, shape stability rate, draping property, and thus is useful for materials of artificial leathers or ladies' clothes. Furthermore, the process of preparing

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such a warp knit according to the present invention gives the warp knit ~~has~~ very excellent warping property and knitting property.

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